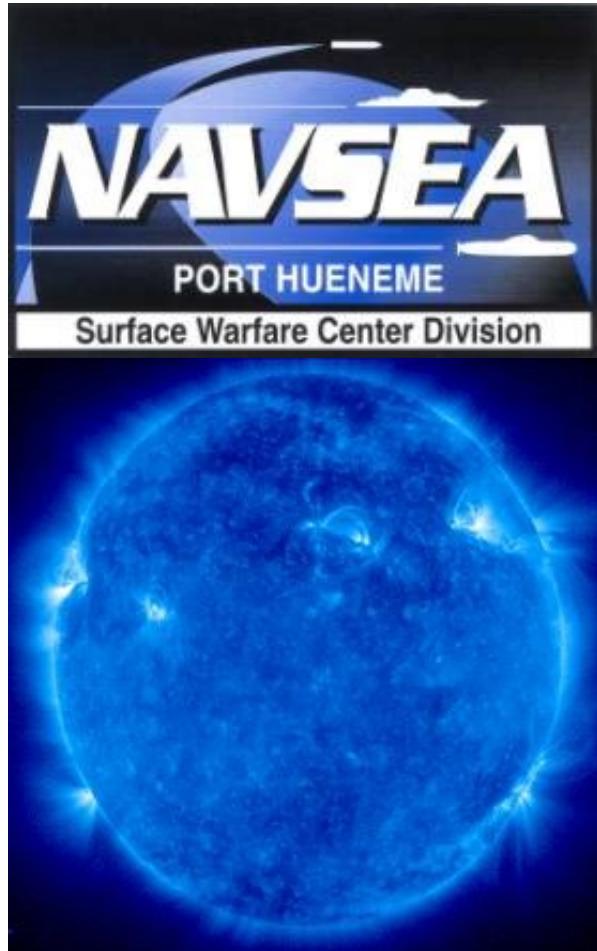


NSWC PHD

White Sands Detachment



Industry Day

Theoretical Studies and

Engineering Research

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By

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Overview

Programmatic & Technical



Programmatic



Need

- **To develop and meet the USER community needs for surface launched vehicles**
- **These vehicles serve a wide rage of technologies in weapon system and sensor development**
 - These vehicles help exercise and stimulate BMC4I systems, Radar and Infrared Sensors, TSPI instrumentation, and Space Experiments
- **The USER Community involves both Commercial and Department of Defense**
 - At times extends in supporting our Allies over seas

Services & Products

- **NAVSEA seeks partners in industry that will supply engineering, hardware and software for a family of surface launched vehicles and facilities**
- **Engineering Services --- vehicle design and analysis**
- **Hardware**
 - Rocket motors modifications and production
 - Payload design and fabrication
- **Instrumentation --- payload design and fabrication to be flown on surface launched vehicles**
- **Provide vehicle build-up and launch operations**
- **Access to proper facilities for ordnance build, electronic labs, environmental qualifications, payload build-up, launch block house, ground support equipment and launchers**

Operation Locations

- **NAVSEA supports launch operations in following locations**
 - White Sands Missile Range, New Mexico
 - Pacific Missile Range, Kauai – Hawaii
 - San Nicolas Island --- of the California Cost
 - Wallops Flight Test Facility, Virginia
 - Australia



Mission Load

- Our mission load varies from year to year as well as the vehicle complexity
- Operations can vary from 5 to 20 launches per year and at various locations
- The vehicles can be a single stage, two-stage or three-stage configuration
- Instrumentation ranges from none to with high level of sophistication

Bottom Line We Tailor the Vehicle to Meet the desired presentation for the “USER”

Government Furnished Equipment (GFE)

- **Industry partners would need to identify the need for GFE**
 - **To include hardware, motors, etc**
 - **To include ordnance and vehicle assembly facilities**
 - **To include workshops and labs**
 - **To include instrumentation**
 - **To include handling gear**

Cost, Schedule & Performance

- The RFP will contain case studies associated with surface launch vehicle
- Industry response must be able to articulate the technical approach in the generation of a flight vehicle
 - Engineering and analysis, facilities, equipment, manning, etc...
- Execution Schedule will need to be provided
- Cost for --- Hardware and Labor Rates
 - Along with the burdened rates and the area that they are applied

Security

- **Industry must be able to support at a minimum US Secret operations**
 - **Personnel must be able to have and maintain a US secret clearance**
 - **Access to facilities to manage, discuss and store classified information**
 - **Access to equipment to operate and store classified material**
 - Such as safe's, computers, etc...
- **Higher type of clearance may be required though rare and will be managed on a case by case basis**

Technical Sample



Surface Launch Vehicles

- List existing motor experience and configuration
 - M-112, MK-12, MK-70, MK-104, Black Brant, Oriole, Star series, Castor Series, Talos, Nike, etc....
- NAVSEA standard configurations
 - Single Stage, Two-Stage, and Three Stage motor stack



Rocket Motor Hardware

- **Refurbishment and rebuilt**
 - Certified for flight
 - Shelf Life Expired
- **Industry propulsion assets**
 - 10" to 30" diameter
- **Interface adaptors**
 - Load bearing tail cans / inter stages
 - Fins
- **Launcher Interfaces**
- **Suitable Ordnance Systems**
 - Initiators, separations, spin-up, de-spin, etc...

Launcher Systems

- **Industry partners need to identify launcher system experience with:**
 - Minimum with: MRL, Athena, 50K and Stool
 - List any other type of launcher systems experience and the class of vehicle flown on those launchers
- **List the ability to manufacture and/or maintain such systems**
 - Such as servicing equipment, firing lines, rails, trolleys, azimuth and elevation drives, etc...
 - Rail / Vehicle interface
- **List launcher access and/or locations supported**

Ground Support Equipment

- **Handling Gear**
 - **Ordnance approved, motor & payload carts, ground equipment**
- **Control Point Equipment**
 - **Suitcase equipment, ordnance control, power systems & vehicle sub-systems**
- **Ground Station**
 - **Telemetry, Command Up-link Transmitters, etc...**
 - **With display functionality**

Facilities

- **Industry will need to provide a list of facilities, locations and qualifications to support operations it owns and/or have access**
 - **Launch Equipment**
 - **Vehicle Assemble Buildings**
 - **Ordnance Buildings**
 - **Environmental qualifications --- i.e. spin, vibration, bending, etc...**

Hardware / Payload Systems

- **Attitude Control Systems**

- Use these systems to re-orient the vehicle in flight: both in flight trajectory and vehicle aspect
- Potential dispersion reduction
- Magnetic based, position based, or stellar based

- **Boost Guidance Systems**

- Dispersion reduction, trajectory shaping

- **Recovery Systems**

- Nose tip and aft recovery systems to re-use and or salvage expensive payload hardware
- Proven system reliability for payloads weighing between 100lbs to 1000lbs

- **Ordnance Decks**

- Used to control timed events while vehicle is in flight

Instrumentation

- **Time, Space, Position**
 - C-band Beacon and/or GPS
- **Attitude**
 - Reference system --- IMU or other
- **Up-link receivers**
 - Flight Termination Systems
 - Command Uplink for task execution
- **Timing System**
 - To control ordnance and/or payload events --- such as separations or on board data recording
- **L and S band Telemetry down links**
 - Bit rate range from 100KBit to 10 Mbit
 - Up to 4 independent streams
 - At time the stream will need to be encrypted for security reasons

Engineering & Analysis

- **Basic vehicle engineering**
 - To include structural, aerodynamic, heating, flight loads, launcher interaction, etc...
- **Performance**
 - Validated models
 - Acceleration & velocity profile, altitude and range vs time, roll history, etc...
 - Multiple degree of freedom simulations
 - Dispersion analysis
 - Ground and flight safety data packages
- **Characterized Behavior**
 - Mean variation, environmental characteristics (acoustic, vibration, thermal)

Data

- **Telemetry Graphical User Interface (GUI)**
 - Depend on the instrumentation team to be able to generate telemetry data based and GUI displays used for flight test evaluation
 - Could be computer screens and/or strip charts
- **Vehicle Performance Verification**
 - Predicted vs Actual
 - Vehicle data base update
 - External Influences --- i.e. meteorology
- **Field Operation Availability**
- **Security --- at time data will require special handling due to classification**
- **Must be able to generate post event reports**
 - 2hr quick look
 - 24hr quick look
 - 30day initial report
 - 90day final report

Manning

- **Availability of disciplines and experience**
 - **Analysis**
 - **Engineering --- multiple disciplines**
 - **Technician**
 - Ordnance, Electrical, Mechanical, etc...
 - **Certification**
- **Instrumentation**
 - **Development and field support**
- **Logistics, Administrative, Fiscal**

Design Review & Documentation

- **Design Reviews**
 - PDR, CDR, MRR, TRR, etc...
- **Verification testing and process**
- **Procedure Control**
 - Hazardous and Non-Hazardous
- **Interface Control Documents**
- **Configuration Management**
- **Inventory Control**
- **Reports**
 - Analysis
 - Engineering Designs --- i.e. mechanical, electrical, etc...

Questions